CLAIMS

WHAT IS CLAIMED:

1. A position estimator, comprising:

a signal filter capable of receiving a sensor measurement and generating a measurement noise variance estimate and a position estimate therefrom;

a multipath detector capable of applying a dynamic threshold against the measurement noise variance estimate to determine whether a multipath condition exists; and

a multipath bias estimator capable of generating a correction for multipath induced measurement bias error from a measurement noise variance estimate for application upon determining that a multipath condition exists.

2. The position estimator of claim 1, wherein the signal filter includes a Kalman filter.

3. The position estimator of claim 1, wherein the sensor measurement is in a spherical coordinate system including an azimuth angle measurement, an elevation angle measurement, and a range measurement.

4. The position estimator of claim 1, wherein the correction is applied to the sensor measurement.

5. The position estimator of claim 1, wherein the correction is applied to the position estimate.

6. The position estimator of claim 1, wherein the multipath detector includes:

a first threshold test capable of receiving an elevation measurement noise variance estimate and generating a first result;

a second threshold test capable of receiving an azimuth measurement noise variance estimate and generating a second result; and

a combiner capable of combining the first and second results and outputting an indication of whether a multipath condition exists.

7. The position indicator of claim 1, wherein the multipath detector includes:

a summer summing an elevation measurement noise variance estimate and an azimuth measurement noise variance estimate; and

a threshold test capable of being applied to the summed measurement noise variance estimates and outputting an indication of whether a multipath condition exists.

8. A method of estimating the position of an object from a sensor measurement, the method comprising:

filtering the sensor measurement with a signal filter including a measurement noise variance estimator to yield a measurement noise variance estimate and a position estimate;

comparing the measurement noise variance estimate against a dynamic threshold to detect whether a multipath condition exists;

determining a correction for a multipath induced measurement bias error from the measurement noise variance estimate if the multipath condition is detected; and

applying the correction to the estimation of the object's position.

9. The method of claim 8, wherein applying the signal filter with the measurement noise variance estimator includes applying a Kalman filter and the measurement noise variance estimator.

10. The method of claim 8, wherein the sensor measurement is measured in a spherical coordinate system including azimuth angle, elevation angle, and range.

11. The method of claim 8, wherein applying the correction includes applying the correction to the sensor measurement.

12. The method of claim 8, wherein applying the correction includes applying the error to the position estimate.

13. The method of claim 8, wherein comparing the measurement noise variance estimate includes:

performing a first threshold test on an elevation measurement noise variance estimate and generating a first result;

performing a second threshold test on an azimuth measurement noise variance estimate and generating a second result; and

combining the first and second results and outputting an indication of whether a multipath condition exists.

14. The method of claim 8, wherein comparing the elevation variance estimate includes:

summing an elevation measurement noise variance estimate and an azimuth variance estimate; and

applying a threshold test to the summed variance estimates and outputting an indication of whether a multipath condition exists.

15. A method for estimating the position of an object from a sensor measurement, the method comprising:

filtering the sensor measurement;

estimating a measurement noise variance of the sensor measurement;

comparing the measurement noise variance estimate against a dynamic threshold;

determining from the comparison whether a multipath condition exists; and

applying a correction for multipath induced measurement bias error generated from the measurement noise variance estimate upon determining that a multipath condition exists.

16. The method of claim 15, wherein filtering the sensor measurement includes filtering the sensor measurement using a Kalman filter.

17. The method of claim 15, wherein the sensor measurement is measured in a spherical coordinate system including an azimuth angle measurement, an elevation angle measurement, and a range measurement.

18. The method of claim 15, wherein comparing the measurement noise variance estimate against the dynamic threshold includes:

applying a first threshold to a measurement noise variance estimate in elevation;

applying a second threshold to a measurement noise variance estimate in azimuth; and

combining the results of comparing elevation and azimuth variance estimates with the first and second thresholds, respectively.

19. The method of claim 15, wherein comparing the measurement noise variance estimate against the dynamic threshold includes:

summing a measurement noise variance estimate in elevation with a measurement noise variance estimate in azimuth; and

applying a threshold to the summed measurement noise variance estimates.

20. A position estimator, comprising:

means for receiving a sensor measurement and generating a measurement noise variance estimate and a position estimate therefrom;

means for applying a dynamic threshold against the measurement noise variance estimate to determine whether a multipath condition exists; and

a multipath bias estimator capable of generating a correction for multipath induced measurement bias error from a measurement noise variance estimate for application upon determining that a multipath condition exists.

21. The position estimator of claim 20, wherein the means for receiving the sensor measurement and generating the measurement noise variance estimate and the position estimate therefrom includes a Kalman filter.

22. The position estimator of claim 20, wherein the sensor measurement is in a spherical coordinate system including an azimuth angle measurement, an elevation angle measurement, and a range measurement.

23. The position estimator of claim 20, wherein the correction is applied to the sensor measurement.

24. The position estimator of claim 20, wherein the correction is applied to the position estimate.

25. The position estimator of claim 20, wherein the means for applying the dynamic threshold against the measurement noise variance estimate to determine whether the multipath condition exists includes:

a first threshold test capable of receiving an elevation measurement noise variance estimate and generating a first result;

a second threshold test capable of receiving an azimuth measurement noise variance estimate and generating a second result; and

a combiner capable of combining the first and second results and outputting an indication of whether a multipath condition exists.

26. The position indicator of claim 20, wherein the means for applying the dynamic threshold against the measurement noise variance estimate to determine whether the multipath condition exists includes:

a summer summing an elevation measurement noise variance estimate and an azimuth measurement noise variance estimate; and

a threshold test capable of being applied to the summed measurement noise variance estimates and outputting an indication of whether a multipath condition exists.

27. A method of estimating the position of an object from a sensor measurement, the method comprising:

means for filtering the sensor measurement with a signal filter including a measurement noise variance estimator to yield a measurement noise variance estimate and a position estimate;

means for comparing the measurement noise variance estimate against a dynamic threshold to detect whether a multipath condition exists;

means for determining a correction for a multipath induced measurement bias error from the measurement noise variance estimate if the multipath condition is detected; and

means for applying the correction to the estimation of the object's position.

28. The method of claim 27, wherein the means for applying the signal filter with the measurement noise variance estimator includes means for applying a Kalman filter and the measurement noise variance estimator.

29. The method of claim 27, wherein the means for applying the correction includes means for applying the correction to the sensor measurement.

30. The method of claim 27, wherein the means forapplying the correction includes means for applying the error to the position estimate.

31. A program storage medium encoded with instructions that, when executed by a computer, perform a method of estimating the position of an object from a sensor measurement, the method comprising:

filtering the sensor measurement with a signal filter including a measurement noise variance estimator to yield a measurement noise variance estimate and a position estimate;

comparing the measurement noise variance estimate against a dynamic threshold to detect whether a multipath condition exists;

determining a correction for a multipath induced measurement bias error from the measurement noise variance estimate if the multipath condition is detected; and

applying the correction to the estimation of the object's position.

32. The program storage medium of claim 31, wherein applying the signal filter with the measurement noise variance estimator in the encoded method includes applying a Kalman filter and the measurement noise variance estimator.

33. The program storage medium of claim 31, wherein applying the correction in the encoded method includes applying the correction to the sensor measurement.

34. The program storage medium of claim 31, wherein applying the correction in the encoded method includes applying the error to the position estimate.

35. A computing apparatus programmed to perform a method of estimating the position of an object from a sensor measurement, the method comprising:

filtering the sensor measurement with a signal filter including a measurement noise variance estimator to yield a measurement noise variance estimate and a position estimate;

comparing the measurement noise variance estimate against a dynamic threshold to detect whether a multipath condition exists;

determining a correction for a multipath induced measurement bias error from the measurement noise variance estimate if the multipath condition is detected; and

applying the correction to the estimation of the object's position.

36. The computing apparatus of claim 35, wherein applying the signal filter with the measurement noise variance estimator in the programmed method includes applying a Kalman filter and the measurement noise variance estimator.

37. The computing apparatus of claim 35, wherein applying the correction in the programmed method includes applying the correction to the sensor measurement.

38. The computing apparatus of claim 35, wherein applying the correction in the programmed method includes applying the error to the position estimate.